Claims

What is claimed is:

1. A system operable to monitor one or more bio/chemical activities within a sample, the system comprising:

a first measurement probe operable to interrogate one or more physical properties of a sample at a first location of the sample, and to output, in response, a first measurement signal;

a second measurement probe operable to interrogate one or more physical properties of the sample at a second location of the sample, and to output, in response, a second measurement signal; and

a comparator coupled to receive the first and second measurement signals, the comparator configured to output a difference signal comprising the difference between the first and second measurement signals, the difference signal corresponding to the difference in one or more bio/chemical activities occurring within the sample at the first location relative to the second location.

2. The system of claim 1, wherein the first and second measurement probes are operable to interrogate the sample's electrical properties at the respective first and second locations.

3. The system of claim 1, wherein the first and second measurement probes are operable to interrogate the sample's optical properties at the respective first and second locations.

4. The system of claim 1, wherein the first and second measurement probes are operable to interrogate the sample's mass properties at the respective first and second locations.

5. The system of claim 1, wherein the first and second measurement probes are operable to interrogate the sample's chemical properties at the respective first and second locations.

6. The system of claim 1, wherein the first and second measurement probes are operable to interrogate the sample's mass and charge properties at the respective first and second locations.

7. The system of claim 1, wherein the first and second measurement signals are non-DC formatted signals, the system further comprising a DC converter configured to convert the first and second measurement signals to respective DC formatted signals.

8. The system of claim 1, wherein the first and second measurement signals comprise DC signals, and wherein the difference signal comprises a DC formatted signal at a voltage level which corresponds to the difference between the first and second measurement signals.

9. The system of claim 1, wherein the comparator comprises a differential amplifier having a first input coupled to the first measurement probe, a second input coupled to the second measurement probe, and an output for providing the difference signal.

10. The system of claim 1, further comprising a correlator having an input coupled to receive the difference signal, and memory operable to retain one or more stored difference signals, each stored difference signal corresponding to a predetermined activity, wherein the correlator compares the difference signal against one or more of the stored difference signals and identifies as occurring with the sample, the activity of the stored difference signal which has the closest correlation to the difference signal.

11. The system of claim 1, further comprising:

a first reference element coupled to the first measurement probe; and

a second reference element coupled to the second measurement probe,

wherein the first measurement probe, the first reference element, the second measurement probe, and the second reference element comprise are coupled together in a bridge circuit configuration.

12. The system of claim 11, wherein the first and second reference elements comprise resistors.

13. The system of claim 11, wherein:

the first reference element comprises a third measurement probe operable to interrogate one or more physical properties of the sample at a third location of the sample, and to output, in response, a third measurement signal; and

the second reference element comprises a fourth measurement probe operable to interrogate one or more physical properties of the sample at a fourth location of the sample, and to output, in response, a fourth measurement signal.

14. The system of claim 11, wherein the comparator comprises:

a first differential amplifier having a first input coupled to the first measurement probe, a second input coupled to the first reference element, and an output;

a second differential amplifier having a first input coupled to the second measurement probe, a second input coupled to the second reference element, and an output; and

a third differential amplifier having a first input coupled to the output of the first differential amplifier, a second input coupled to the output of the second differential amplifier, and an output for providing the difference signal.

15. The system of claim 14, wherein the comparator further comprises a phase meter having a first input coupled to the output of the first differential amplifier, and a second input coupled to the output of the second differential amplifier, the phase meter operable to output the relative phase difference between the first and second differential amplifier output signals.

16. The system of claim 11, further comprising a first signal ground coupled to the sample at a third location proximate to the first measurement probe, wherein the first measurement probe interrogates the sample by transmitting a signal between the first measurement probe and the first signal ground.

17. The system of claim 16, further comprising a second signal ground coupled to the sample at a fourth location proximate to the second measurement probe, wherein the second measurement probe interrogates the sample by transmitting a signal between the second measurement probe and the second signal ground.

18. The system of claim 13, further comprising:

a signal probe coupled to the sample at a fifth location of the sample, the signal probe configured to apply a test signal to the sample; and

a signal ground coupled to the sample at a sixth location of the sample, the signal ground operable to provide a ground potential to the applied test signal.

19. A system operable to monitor one or more bio/chemical activities within a sample, the system comprising:

a first measurement probe coupled to the sample at a first location of the sample, the first measurement probe configured to interrogate one or more physical properties of the sample at the first location and to output, in response, a first measurement signal;

a second measurement probe coupled to the sample at a second location of the sample, the second measurement probed configured to interrogate one or more physical properties of the sample at the second location, and to output, in response, a second measurement signal; and

a comparator coupled to receive the first and second measurement signals, the comparator configured to output a difference signal comprising the difference between the first and second measurement signals, the difference signal corresponding to the difference in one or more bio/chemical activities occurring at the first location relative to the second location.

20. The system of claim 19, wherein the first and second measurement probes are operable to interrogate the sample's electrical properties at the respective first and second locations.

21. The system of claim 19, wherein the first and second measurement probes are operable to interrogate the sample's optical properties at the respective first and second locations.

22. The system of claim 19, wherein the first and second measurement probes are operable to interrogate the sample's mass properties at the respective first and second locations.

23. The system of claim 19, wherein the first and second measurement probes are operable to interrogate the sample's chemical properties at the respective first and second locations.

24. The system of claim 19, wherein the first and second measurement probes are operable to interrogate the sample's mass and charge properties at the respective first and second locations.

25. The system of claim 19, wherein the first and second measurement signals are non-DC formatted signals, the system further comprising a DC converter configured to convert the first and second measurement signals to respective DC formatted signals.

26. The system of claim 19, wherein the first and second measurement signals comprise DC formatted signals, and wherein the difference signal comprises a DC formatted signal at a voltage level which corresponds to the difference between the first and second measurement signals.

27. The system of claim 19, wherein the comparator comprises a differential amplifier having a first input coupled to the first measurement probe, a second input coupled to the second measurement probe, and an output for providing the difference signal.

28. The system of claim 19, further comprising a correlator having an input coupled to receive the difference signal, and memory operable to retain one or more stored

difference signals, each stored difference signal corresponding to a predetermined activity, wherein the correlator compares the measured difference signal against one or more of the stored difference signals and identifies as occurring with the sample, the activity of the stored difference signal which has the closest correlation to the measured difference signal.

29. The system of claim 19, further comprising:

a first reference element coupled to the first measurement probe; and

a second reference element coupled to the second measurement probe,

wherein the first measurement probe, the first reference element, the second measurement probe, and the second reference element comprise are coupled together in a bridge circuit configuration.

30. The system of claim 29, wherein the first and second reference elements comprise resistors.

31. The system of claim 29, wherein:

the first reference element comprises a third measurement probe coupled to the sample at a third location, the third measurement probe configured to interrogate one or more physical properties of the sample at the third location of the sample, and to output, in response, a third measurement signal; and

the second reference element comprises a fourth measurement probe coupled to the sample at a fourth location of the sample, the fourth measurement probe configured to interrogate one or more physical properties of the sample at the fourth location, and to output, in response, a fourth measurement signal.

32. The system of claim 29, wherein the comparator comprises:

a first differential amplifier having a first input coupled to the first measurement probe, a second input coupled to the first reference element, and an output;

a second differential amplifier having a first input coupled to the second measurement probe, a second input coupled to the second reference element, and an output; and

a third differential amplifier having a first input coupled to the output of the first differential amplifier, a second input coupled to the output of the second differential amplifier, and an output for providing the output difference signal.

33. The system of claim 32, wherein the comparator further comprises a phase meter having a first input coupled to the output of the first differential amplifier, and a second input coupled to the output of the second differential amplifier, the phase meter operable to output the relative phase difference between the first and second differential amplifier outputs.

34. The system of claim 29, further comprising a first signal ground coupled to the sample at a third location proximate to the first measurement probe, wherein the first measurement probe interrogates the sample by transmitting a signal between the first measurement probe and the first signal ground.

35. The system of claim 34, further comprising a second signal ground coupled to the sample at a fourth location proximate to the second measurement probe, wherein the second measurement probe interrogates the sample by transmitting a signal between the second measurement probe and the second signal ground.

36. The system of claim 31, further comprising:

a signal probe coupled to the sample at a fifth location of the sample, the signal probe configured to apply a test signal to the sample; and

a signal ground coupled to the sample at a sixth location of the sample, the signal ground operable to provide a ground potential to the applied test signal.

37. A system operable to monitor one or more bio/chemical activities within a first sample relative to a second sample, the system comprising:

a first measurement probe operable to interrogate one or more physical properties of a first sample at a first location of the first sample, and to output, in response, a first measurement signal;

a second measurement probe operable to interrogate one or more physical properties of a second sample at a first location of the second sample, and to output, in response, a second measurement signal; and

a comparator coupled to receive the first and second measurement signals, the comparator configured to output a difference signal comprising the difference between the first and second measurement signals, the difference signal corresponding to the difference in one or more bio/chemical activities occurring within the first sample at the first location thereof relative to the second sample at the first location thereof.

38. The system of claim 37, wherein the first sample is a test sample containing or believed to contain one or more predetermined bio/chemical activities, and wherein the second sample comprises a reference sample which is known to contain one or more of the predetermined bio/chemical activities, wherein when the difference signal is within a predetermined range, the test sample is determined as comprising substantially the same one or more bio/chemical activities as the reference sample.

39. The system of claim 37, wherein the first and second measurement probes are operable to interrogate the first and second sample's electrical properties at respective first locations of each sample.

40. The system of claim 37, wherein the first and second measurement probes are operable to interrogate the first and second sample's optical properties at respective first locations of each sample.

41. The system of claim 37, wherein the first and second measurement probes are operable to interrogate the first and second sample's mass properties.

42. The system of claim 37, wherein the first and second measurement probes are operable to interrogate the first and second sample's chemical properties at respective first locations of each sample.

43. The system of claim 37, wherein the first and second measurement probes are operable to interrogate the first and second sample's mass and charge properties at respective first locations of each sample.

44. The system of claim 37, wherein the first and second measurement signals are non-DC formatted signals, the system further comprising a DC converter configured to convert the first and second measurement signals to respective DC formatted signals.

45. The system of claim 37, wherein the first and second measurement signals comprise DC formatted signals, wherein the difference signal comprises a DC formatted signal at a voltage level which corresponds to the difference between the first and second measurement signals.

46. The system of claim 37, further comprising a correlator having an input coupled to receive the difference signal, and memory operable to retain one or more stored difference signals, each stored difference signal corresponding to a predetermined bio/chemical activity, wherein the correlator compares the difference signal against one or more of the stored difference signals and identifies as occurring with the sample, the bio/chemical activity of the stored difference signal which has the closest correlation to the difference signal.

47. The system of claim 37, further comprising:

a first reference element coupled to the first measurement probe; and

a second reference element coupled to the second measurement probe,

wherein the first measurement probe, the first reference element, the second measurement probe, and the second reference element comprise are coupled together in a bridge circuit configuration.

48. The system of claim 47, wherein the first and second reference elements comprise resistors.

49. The system of claim 47, wherein:

the first reference element comprises a third measurement probe coupled to the first sample at a second location of the first sample, the third measurement probe configured to interrogate one or more physical properties of the first sample at the second location, and to output, in response, a third measurement signal; and

the second reference element comprises a fourth measurement probe coupled to the second sample at a second location of the second sample, the fourth measurement probe configured to interrogate one or more physical properties of the second sample at the second location, and to output, in response, a fourth measurement signal.

50. The system of claim 47, wherein the comparator comprises:

a first differential amplifier having a first input coupled to the first measurement probe, a second input coupled to the first reference element, and an output;

a second differential amplifier having a first input coupled to the second measurement probe, a second input coupled to the second reference element, and an output; and

a third differential amplifier having a first input coupled to the output of the first differential amplifier, a second input coupled to the output of the second differential amplifier, and an output for providing the difference signal.

51. The system of claim 50, wherein the comparator further comprises a phase meter having a first input coupled to the output of the first differential amplifier, and a second input coupled to the output of the second differential amplifier, the phase meter operable to output the relative phase difference between the first and second differential amplifier outputs.

52. The system of claim 48, further comprising a first signal ground coupled to the sample at a third location proximate to the first measurement probe, wherein the first measurement probe interrogates the sample by transmitting a signal between the first measurement probe and the first signal ground.

53. The system of claim 52, further comprising a second signal ground coupled to the sample at a fourth location proximate to the second measurement probe, wherein the second measurement probe interrogates the sample by transmitting a signal between the second measurement probe and the second signal ground.

54. The system of claim 49, further comprising:

a signal probe coupled to (i) the first sample at a third location of the first sample, and (ii) the second sample at a third location of the second sample; and

a signal ground probe coupled to (i) the first sample at a fourth location of the first sample, and (ii) the second sample at a fourth location of the second sample.

55. The system of claim 49, further comprising:

a signal probe coupled to the first sample at a third location of the first sample, the signal probe operable to conduct a test signal to the first sample;

a signal ground probe coupled to the second sample at a third location of the second sample; and

a signal path coupled between the first and second samples, the signal path operable to support the propagation of the text signal between the first and second samples.

56. The system of claim 49, further comprising:

a signal probe coupled to (i) the first sample at a third location of the first sample, and (ii) the second sample at a third location of the second sample, the signal probe operable to conduct a test signal to the first and second samples; and

a signal path coupled between the first and second samples and to a signal ground, the signal path operable to support the propagation of the test signal therealong.

57. A system operable to monitor bio/chemical activities within a plurality of samples, the system comprising:

three or more measurement probes operable to interrogate one or more physical properties of a respective three or more samples, and to output, in response, a respective three of more measurement signals;

a comparator coupled to receive at least two of the three of more measurement signals, the comparator configured to output a difference signal corresponding to the difference in bio/chemical activity occurring within a first sample relative to a second sample, whereby the interrogation of the first sample produces one of the at least two measurement signals, and the interrogation of the second sample produces the second of the at least two measurement signals.

58. The system of claim 57, further comprising a switch having an input coupled to receive at least two of the three of more measurement signals, the switch operable to selectively output one or more of the at least two received measurement signals.

59. The system of claim 58, wherein the comparator is coupled to receive the first measurement signal, and the input of the switch is coupled to receive the second and third measurement signals, and wherein the switch is operable to selectively output either the second measurement signal or the third measurement signal.

60. The system of claim 58, further comprising:

a first reference element coupled to the first measurement probe; and

a second reference element coupled to the second measurement probe,

wherein the first measurement probe, the first reference element, the second measurement probe, and the second reference element comprise are coupled together in a bridge circuit configuration.

61. The system of claim 59, wherein the first and second reference elements comprise resistors.

62. The system of claim 57, further comprising a switch having an input coupled to receive all of the three of more measurement signals, the switch operable to selectively output two or more of the received three or more measurement signals.

63. The system of claim 62, wherein the three of more measurement probes comprises four measurement probes operable to interrogate one or more physical properties of a respective four samples, and to output, in response, a respective four measurement signals.

64. The system of claim 63, further comprising a switch having an input coupled to receive the four measurement signals and two or more outputs coupled to the comparator, the switch operable to selectively output two or more of the four measurement signals to the comparator.

65. The system of claim 62, wherein the three of more measurement probes comprises five or more measurement probes operable to interrogate one or more physical properties of a respective five or more samples, and to output, in response, a respective five or more measurement signals.

66. The system of claim 65, further comprising a switch having an input coupled to receive the five or more measurement signals and four outputs coupled to the comparator, the switch operable to selectively output four of the five or more measurement signals to the comparator.